Abstract Submitted
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Transition in oblique shock/boundary layer interactions at Mach 5.92[1] ANUBHAV DWIVEDI, PRAKASH SHRESTHA, NATHANIEL HILDEBRAND, J.W. NICHOLS, M.R. JOVANOVIC, G.V. CANDLER, Univ of Minn - Minneapolis — We use the compressible flow solver US3D to perform DNS of an oblique shock wave interacting with a laminar boundary layer over an adiabatic flat plate at Mach 5.92. Simulations are repeated with different spanwise extents. The adverse pressure gradient created by the shock causes the boundary layer to separate, leading to the formation of a recirculation bubble downstream. We consider interactions of various strengths by varying the shock angle. A sufficiently strong interaction causes the flow to become $3-D$, unsteady and eventually transition to turbulence. We observe long streamwise streaks downstream of the reattachment point which eventually break into turbulence. In the present work, we characterize the spatio-temporal dynamics of the unsteady separation bubble and these streaks using Fourier analysis and Sparsity Promoting Dynamic Mode Decomposition. To investigate the origin of these streaks we also analyze the role of linear Görtler instability resulting from the curvature of the streamlines induced by the separation bubble.

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